

"Express Mail" mailing label number:

EV 335895078 US

CONNECTION MANAGEMENT FOR DATA NETWORKS

Kenneth R Jones
Brian A. Gonsalves
Marc A. Sullivan
Philip T. Kortum
Jeffrey Multach

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates generally to connection management for data networks.

BACKGROUND OF THE DISCLOSURE

[0002] Typically dynamic connections for digital subscriber line (DSL) services are created "on demand". When a network request is received by a DSL modem, the DSL modem establishes a connection to the network. After a period of network inactivity the network connection is terminated. This termination procedure is used to free up network resources to service other customers.

[0003] The problem with this approach is that during the time taken to build a connection, the end user is unable to use network applications. This can cause a noticeable delay to the end user that is viewed negatively and interferes with normal usage of the DSL connection. In addition some applications will appear to fail because the network connection cannot be created in the time window that the client application expects.

[0004] A second alternative, which is implemented in many consumer gateways is to constantly maintain a connection. From an end-user perspective, this solution works very well. From the perspective of the network provider, this is undesirable because network

resources are being consumed even when the end user does not require network connectivity.

[0005] Currently telecommunication providers and other internet service providers (ISPs) are either deploying or planning to deploy digital subscriber line (DSL) routers and point to point over Ethernet (PPPoE) modems to replace currently deployed ADSL modems in the consumer and small business markets. Surveys have determined that a majority of home users disconnect their DSL PPPoE connections while they are not in use. This is primarily done for security reasons. This is accomplished by using a graphical user interface on Ethernet PPPoE client software to open or close the PPPoE session.

[0006] However, DSL routers and PPPoE modems don't provide an easy method to disconnect the PPPoE DSL connection. The current method is to connect to the router using a web browser and go through a series of browser windows to select the disconnect/connect tabs. Many users have more than one PC or other device connected to their routers, so if they simply turn the router off, they will also turn off their LAN connections. These users typically want to continue using their LAN to allow local PC's to communicate and to print/share files, while their wide area network (WAN) is disconnected for security reasons. Unplugging the WAN cable at the router is not a good solution because frequent plugging/unplugging will damage the jack.

[0007] Accordingly, there is a need for an improved system and method of selectively connecting and disconnecting DSL network communication paths.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a block diagram of an illustrative system having a DSL router or PPPoE modem.

[0009] FIG. 2 is a general diagram that illustrates an end-user computer connected to a DSL router or PPPoE modem.

[0010] FIG. 3 is a general diagram that illustrates the display of the computer shown in FIG. 2.

[0011] FIG. 4 is a general diagram that illustrates DSL equipment with a PPPoE connect/disconnect switch.

[0012] FIG. 5 is a block diagram that illustrates connection and detection of a network capable device.

[0013] FIGS. 6-9 are flow charts that illustrate methods of using a DSL network.

DETAILED DESCRIPTION OF THE DRAWINGS

[0014] In a particular embodiment, the disclosure is directed to a method of making a digital subscriber line (DSL) connection to a remote network. The method includes detecting the presence of a powered-on network capable device that is connected to a DSL modem; establishing a network connection over a DSL line to the remote network after detecting the presence of the powered on network capable device; terminating the network connection over the DSL line after detecting an absence of network capable devices connected to the DSL modem; and releasing network resources supported by the remote network after the network connection is terminated.

[0015] In another embodiment, a digital subscriber line communication system is disclosed. The system includes a digital subscriber line (DSL) router coupled to a digital subscriber line connected to a remote digital subscriber line access multiplexer, and a digital subscriber line between the digital subscriber line router and the digital subscriber line access multiplexer. A network connection is made over the digital subscriber line after the detection logic detects the presence of the powered-on network capable device. The digital subscriber line router includes detection logic to detect the presence of a powered-on network capable device that is connected to the DSL router

[0016] Referring to FIG. 1, an illustrative system is shown. The system includes a DSL router or PPPoE modem 110 coupled to the internet 116 via a DSL line 112. The DSL router/PPPoE modem 110 supports multiple computers such as a first computer 102 and a second computer 104. Computers 102, 104 are connected via local area network 108 and are connected to the DSL router 110 via a local area network connection such as Ethernet

connection 106 as illustrated. A wide area network (WAN) 114 is between the DSL router 110 and internet network 116.

[0017] Referring to FIG. 2, an illustrative embodiment is shown. The computer 102 is connected via the Ethernet connection 106 to a DSL router or PPPoE modem which in turn is connected over DSL line 112 to the internet 116. The first illustrative computer 102 includes a display 200 which has a graphic icon 202 on the display. The graphic icon 202 illustrates a connection or disconnection status of the PPPoE connection from the computer 102 through the DSL router 110 into the internet 116.

[0018] Referring to FIG. 3, an embodiment of the display 200 is shown. Display 200 includes a soft switch icon 302 and allows a user to select connection or disconnection of the PPPoE session. In the event that a PPPoE session has been activated then a connection indication is shown by the PPPoE icon 202, such as illustrated by the WAN PPPoE connection green indicator identifying a connection via graphic icon 306. After the PPPoE session has been disconnected, then a disconnected status is shown at the icon, such as a WAN PPPoE red indicator identifying a disconnect status 304. The display 200 and the associated icon 202 allows a user to select connection or disconnection of the PPPoE session it allows users to monitor the connection status.

[0019] Referring to FIG. 4, another embodiment of a system that provides selective connection of a PPPoE session is shown. The system includes a first computer 102 connected an Ethernet connection to a DSL router or PPPoE modem 110. The DSL router or PPPoE modem 110 is connected over a DSL line 112 to the internet 116. In this embodiment, the DSL router includes a PPPoE connection/disconnection switch 402. The switch 402 is a physical hardware switch that allows a user or technician to selectively connect or disconnect a PPPoE session.

[0020] Referring to FIG. 5, another embodiment of a system having a DSL modem and a local area network (LAN) and a wide area network (WAN) connection is shown. The system includes DSL modem 506, which is coupled over a LAN connection 504 to a network capable device 502, such as a computer. The DSL modem 506 is connected

over DSL line 520 to the internet. DSL modem 506 includes a network capable device detection module 508 and a DHCP lease assignment module 510.

[0021] Referring to FIG. 6, a method of operating the system illustrated in FIG. 5 is shown. The presence of a powered-on network capable device connected to a DSL modem is detected, at 602. A network connection is established over the DSL line to the network after detecting the presence of the powered-on network capable device, at 604. The network connection over the DSL line is terminated after detecting an absence of any network capable device being connected to the DSL modem, at 606. Network resources are released that support the network after the network connection has been terminated, as shown at step 608.

[0022] Referring to FIG. 7, another method of operation is shown with respect to the system of FIG. 5. A dynamic lease is assigned to a network capable device to permit subsequent connection to a remote network via a DSL modem, at step 702. A network connection is then established between the DSL modem over a DSL line and to the remote network after detecting the presence of a network capable device having an assigned lease, at 704. Sometime during the transmission session, it is determined that the lease has expired, at 706. After determining that the lease has expired, the network connection over the DSL line is terminated, as shown at 708.

[0023] Referring to FIG. 8, another embodiment of a method of operating a system having a wide area network connection is shown. A user command is received after a user selects a graphic display icon on a display screen, at 802. The graphic display icon is used to selectively connect a PPPoE wide area network connection from a router to a remote network. The router is instructed to make a PPPoE connection over the wide area network in response to receiving the user command, at 804. Optionally, a second user command may be received after the user selects the graphic icon to disconnect the PPPoE connection and to instruct the router to disconnect the connection, as shown at 806.

[0024] Referring to FIG. 9, another method of operating a data communication system is shown. A manual connection command is received after a user activates a manual switch on a DSL router, at 902. The manual switch is used to selectively connect a PPPoE wide

area network connection from the DSL router to a remote network. The router is instructed to make a PPPoE connection over the wide area network in response to receiving the manual connection command, as shown at 904. The manual switch may also receive a manual disconnect command after the user activates the switch in order to disconnect the PPPoE connection, at step 906. The router is instructed to disconnect the PPPoE connection in response to receiving the manual disconnect command, at 908.

[0025] The above-disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments which fall within the true spirit and scope of the present invention. Thus, to the maximum extent allowed by law, the scope of the present invention is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.